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To What Extent can Children's Geography Books Help a Primary School Teacher Explain Cause and Purpose?

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New teachers and those without a strong background in geography tend to neglect 'higher level' thinking, including causal explanations and thinking about reasons in primary school geography. This is a problem that training has yet to address effectively, at least in the UK. It could be that children's textbooks may help such teachers address these deficiencies. To assess the potential of such books, 29 were analysed to gauge their concern for causal understanding (cause and purpose). Some showed no such concern. Others showed a selective concern that could, on occasions, be useful to a teacher. There was, however, little evidence of an attempt to foster children's grasp of the reasons underpinning their geographical enquiry. The conclusion was that these books had the potential to support teachers, up to a point. One problem anticipated is that some teachers may not be able to recognise a 'good' book. In that event, these teachers benefit from training (either initially or in-service) in textbook evaluation, selection and use.

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Introduction

Causal understanding and geography

To have a causal understanding of something is to know why, to have the reasons that underpin it, to know cause and effect, to point to the purpose or intention behind it. We are, by our nature, explanatory animals. Reasons give us a handle on the world, they put events in order and make them understandable and, sometimes, predictable. A need for reasons can be motivating and, when found, surprisingly satisfying. Knowledge stitched together with reasons can also be very durable (Newton, 2000). There was a time in schools, more than a century ago, when naming bays and capes was sufficient for a geography lesson (Graves, 2001). This is not so now. Geography does not simply describe the world but aims to explain it (Becher, 1994). This does not mean that facts are unimportant: without them there would be nothing to explain. The explaining, however, calls for reasons and 'higher order thinking' to knit the facts into more or less coherent understandings (van der Schee *et al.*, 2003; Vankan, 2003). This is reflected in requirements for school geography. For example, the National Curriculum for Geography for England (DfEE/QCA, 1999: 110–13) requires that children between the ages of 5 and 11 years develop 'knowledge and understanding of places, patterns and processes, and environmental change and

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sustainable development'. In connection with places, for instance, children must learn 'why places change' and 'why places are similar to and different from other places in the world'. Relating to patterns and processes, they must 'explain patterns made by individual physical and human features in the environment'. To do with environmental change and development, they must know 'why people may seek to manage environments sustainably'. Each of these calls for a grasp of causal and purposive reasons embedded in explanations that, together, constitute understandings (Newton, 2000). In addition, in the UK, the National Curriculum for geography requires that children should practise 'geographical enquiry and skills' (DfEE/QCA, 1999). To the extent that the children should know the reasons underpinning their actions, this also calls for causal and purposive understandings, otherwise these actions would be only rule-driven procedures (QCA, 1998a).

Teaching for causal understanding

English primary school teachers (teaching children of 5 to 11 years) generally have to teach most subjects of the National Curriculum, whatever their own educational background. Many of them will have only an elementary education in geography. Such teachers are known to avoid reasons and emphasise the acquisition of facts. Catling (1999a: 284) has pointed to, for example, the way primary school teachers 'have a limited appreciation of the key ideas in geography and find it difficult to engage children in seeking explanations and in making generalisations'. As Hattie (2004) has described, subject content knowledge is an important aspect of classroom success of a teacher. Without it, confidence in teaching can be low and avoidance of causal explanation high (Carlsen, 1991). To add to the problem in the UK, teacher training courses for the primary school do not have to have a strand dealing with geography and 'taster' courses can be short and superficial (TTA, 2003). But even teachers with a strong background in a subject may not be able to transform it into a form they can teach (Geddis, 1993; Holt-Reynolds, 1999; Lee, 2003; Martin, 2000) or may avoid reasons in the belief that knowing why is beyond young children (e.g. Newton & Newton, 2000). As Martin (2000: 242) succinctly puts it, 'Expertise in a subject does not mean expertise as a teacher of the subject'.

As far as the children are concerned, there is ample evidence that they can grasp causal reasoning. The basics of causal reasoning are well established by four years of age. While the ability to notice relationships, ascribe them accurately and manipulate them has limits, the potential to understand cause and purpose is present from an early age (Goswami, 1998; Halford, 1993; Kuhn *et al.*, 1995). Meltzoff (1995) concluded that even 18-month infants have some grasp of physical causality (that explains the behaviour of things) and psychological causality (that explains the behaviour of people through their goals and purposeful acts). On this basis, teachers might reasonably be expected to foster the development of simple causal explanations in geography lessons. Those who lack a grasp of geography, however, could have a problem with this. Similarly, those unable to transform their knowledge could find it difficult. There is also a strong tendency for the novice (newly qualified teacher) and non-specialist teacher (without a strong background in geography) to teach in the way they were taught when children themselves (Moallem, 1998). Models from the past

may not be relevant to current approaches and expectations. Even teachers who know something of the subject may avoid causal explanation (Martin, 2000). Taken together, this suggests that an avoidance of causal explanations, reasons and 'higher order' thinking could be a significant problem in the primary classroom. Is there some ready and convenient source of support?

The textbook as a guide to teaching

Rymarz and Engebretson (2005) addressed the same problem in teaching religious education in the secondary school in Australia, where it may be taught by non-specialists. They found that a textbook was welcomed by most teachers and particularly by those who were not specialists in religious education (for the same in other contexts, see Grossman *et al.*, 1989; Issitt, 2004; Newton *et al.*, 2002). They concluded that the textbook helped by enabling and enhancing the teaching, letting teachers see what to teach and what mattered most, helping them teach it in more depth, and by guiding their assessment of learning. The effect on the students was significant. They had better attitudes to religious education and the quality of learning was better. This textbook was one that had been prepared for the task, a process that can be expensive in terms of time and money. The question is, could existing books be used in this way in geography? If so, it could be an easy solution to the problem with the advantage that teachers could choose the books they are comfortable with. Before exploring this further, however, there can be some prejudice against book use that has to be considered.

Issitt (2004) has pointed out that, although textbooks are universally used, they are often derided in the UK. To confess to relying on a book is tantamount to broadcasting your ignorance, laziness or both. It is assumed that the children learn, if at all, by the passive acquisition of information from the page. But the book is only an object; it is a tool to teach with and how it is used depends on the teacher. Teachers with knowledge of a subject often use a book flexibly and selectively while those low in experience, subject knowledge and confidence often rely on a book to tell them what is appropriate and to support their classroom discourse (see e.g. Grossman *et al.*, 1989; Newton *et al.*, 2002). As Rymarz and Engebretson (2005) found out, a non-specialist with a book is often better than one without. This depends, however, on there being books that address the problem. Here, this means providing for causal understanding. Could primary school geography textbooks help teachers 'emphasize understanding, reasoning and connections amongst ideas' (Borko & Putnam, 1996: 686). In particular, do they provide reasons? As Lipman (1991) has succinctly put it, to foster reasoning, we need books that embody and model it. Catling (1999b), however, has pointed to a lack of research in this area. This study seeks to answer the question and then considers some implications.

The Study

Clauses of cause and purpose

Here, operationally, causal understanding is taken to mean being able to provide reasons for events and situations, that is, knowing why. Statements of cause and purpose are intended to help a reader know why. The former provide the reasons as a causal relationship and the latter provide them as a purpose,

intention or function. For instance, 'Grass stops the dunes moving because it traps the sand amongst its stems and roots', states a fact and explains it with a cause. Similarly, 'The workforce went on strike in order to obtain better conditions', explains the strike by its purpose. Assuming that writers do not deliberately avoid such statements, we would expect to find them in their explanations. Working with expository text, Graesser and Hemphill (1991: 206) show that teleological explanations (that is, explanation by purpose, intent or function) are more likely in biological and technological text than in text about physics. To illustrate, for text in 'The Last Word' answers to readers' questions (a regular column in *New Scientist*), a random sample of 45 answers to physical science questions, revealed 4.4% of physical causes and no clauses of purpose. In a similar sample of 42 responses to technological questions, 16.7% of the clauses provided purposes and none provided physical causes. This shows that the incidence of clauses of cause and purpose can point to the explanatory flavour of text. It is not to say that writers use only these explanatory devices but that their incidence indicates a concern for certain kinds of causal relationship.

Materials

A textbook was taken to be 'a focused educational programme in text allied to a scheme of work' and for use by learners (Issitt, 2004: 65). Teacher training education libraries and resource centres were the source of an opportune sample of such books. Twenty-nine textbooks for teaching National Curriculum geography in Key Stage 2 (for children aged 7 to 11 years in the primary school) were analysed.

Procedure

The analysis had two stages. In the first stage, the text was divided into clauses (a combination of words in which something is said about something else using a finite verb). Clauses are commonly used as units of textual analysis (Weber, 1990) and these formed the data pool. The pool included questions directed at the reader where the answer would be a cause or purpose. Clauses of cause (typically signalled by words like *as*, *because*, *since*) and purpose (typically signalled by *in order to*, *to*, *so that*) were noted. When these signals are not used, supplying them can test the function of the clause (Greenbaum, 1996). The proportions of cause and purposes clauses were recorded for each book. The cause and purpose clauses were also classified according to the causal agent. The agent may be animate (human or other) or inanimate (physical). For instance, a purpose clause with human agency is involved in: 'He took medicine in order to get well'. A purpose clause with animate, non-human agency is involved in: 'The flower has a scent to attract insects'. A cause clause with an inanimate agent is involved in: 'This happens because water presses equally in all directions'. This stage stems from an approach developed for analysing discourse in the classroom and in text (Newton & Newton, 2000; Newton *et al.*, 2002).

Descriptive and inferential statistics help make some generalisations apparent. Nevertheless, an understanding of the data must draw on a direct examination of clauses and books. In the second stage, the data pool of clauses was subjected to a phenomenographic analysis to identify how these clauses were used. This involved an iterative sort of the clauses into groups or categories on the basis of

their similarities. Categories were re-sorted, if necessary, as successive clauses were considered. At the end of the process, the attributes of each category were made explicit and illustrated by representative examples. In this instance, the aim of the sort was to identify different ways in which the clauses were used so the categories reflected that. (For a full account of the general procedure, see Marton, 1981.)

The textual analysis was done by a primary teacher trained for the purpose by the authors and experienced in teaching with and using books of this kind with 7–11 year olds. Such text usually has a simple structure to increase the likelihood that children will grasp its meaning. This tends to make most of the analysis unproblematic. The few instances of uncertainty were discussed and a consensus regarding the classification obtained.

Sampling

Ignoring title and index pages, each book was divided into quarters. The beginnings and ends of the topics under discussion at these quarter points were located and the text between was parsed into clauses. On average, this amounted to about 300 clauses per book. (For a 32 page book, for example, these would typically be drawn from some eight pages.) This process allows for the possibility that the expository style may vary throughout a book. All the books included illustrations. Text in illustrations that occurred in the samples was analysed similarly.

Results

The incidence of clauses of cause and purpose

Clauses of cause ranged from nil to 5.30% of text with a mean of 1.65% (s.d. 1.32). Ten books had less than 1% of such clauses. Clauses of purpose ranged from nil to 11.00% of text with a mean of 4.29% (s.d. 2.67). One book had less than 1% of such clauses. On average, there were more than twice as many clauses of purpose as clauses of cause. (This difference was statistically significant: *t*-test, $p < 0.0000$.)

Figure 1 shows the clause proportions in each book. The samples from Books 1 and 2, for example, contained relatively high percentages of purpose clauses. The samples from many books (those to the right of the graph) contained relatively few and one (Book 29) had none. While on average, clauses of cause were not especially common, the percentage of cause clauses exceeded that of purpose clauses in three books (23, 28, 29). Clauses of cause, however, were absent in the samples from Books 2, 3, 17, 27.

How the clauses were used

The interpretation of such figures rests on the phenomenographic analysis which helped to identify several uses of the cause and purpose clauses. It is important to add that this kind of analysis identifies categories in a given data pool (consisting of 245 clauses here). This does not mean that there will be no other categories in the population at large. While the size of each category has been indicated, the figures should be taken as indicative only. Additional books could alter the proportions. In practice, however, the process of adding to the

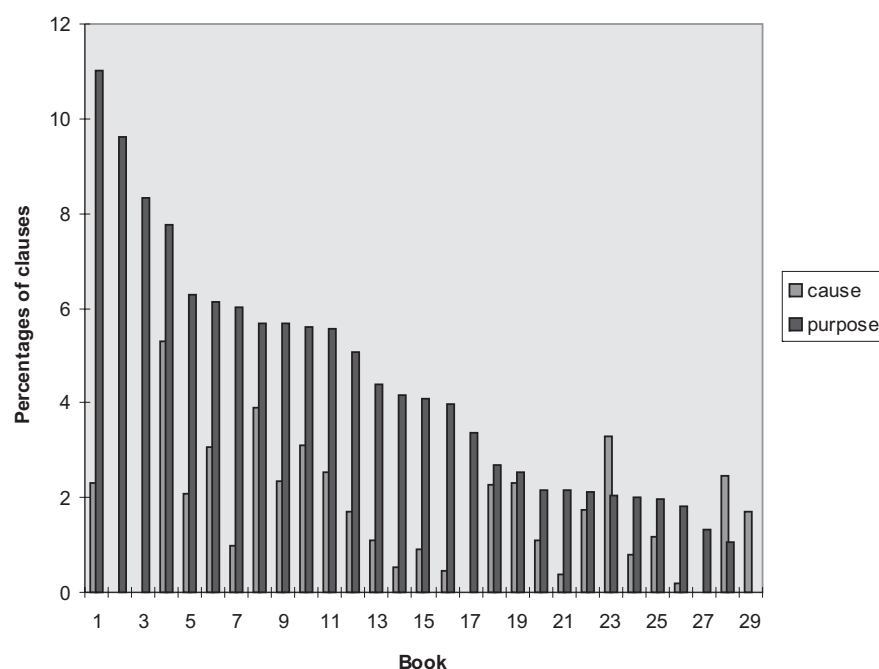


Figure 1 Percentages of clauses of cause and purpose in each book

data pool is often one of diminishing returns as far as categories are concerned. We have no reason to believe that the major categories identified would not remain so if the data pool were larger.

Category 1: Explaining the behaviour and adaptation of plants and non-human animals in specific environments

These clauses of purpose tended to be associated with explaining aspects of natural science. (Biological mechanisms are often afforded a vitalism that enables explanation by function or intention (Audi, 1995: 791; Graesser & Hemphill, 1991)). This category accounted for some 49% of the data pool. For example:

‘Species struggle to survive’.

‘Many plants have spikes to protect them against grazing animals’.

‘The creatures that live there are adapted to moving quickly to escape predators’.

‘The woodcock often nests directly over a nest of woodmice to gain extra warmth for the incubating eggs’.

‘Their leaves have a waxy coating to cut down the loss of water’.

Category 2: Explaining human action in specific environments

These clauses were associated with intentions and purposes of people in, for example, putting the environment to use and adapting the environment for living. This category accounted for about 24% of the data pool. For example:

'Other people cleared forests to create farmland'.

'They . . . traveled long distances to hunt food'.

Category 3: Explaining subject-related practices and processes

This infrequent use of the purpose clause (less than 1% of the data pool) was in connection with matters pertaining to the subject's approaches, methods or definitions. For example:

'Although many scientists use the amount of rainfall to classify an area as a desert . . .'

There were similarly several uses of clauses of cause.

Category 4: Explaining physical effects in specific environments

These clauses of cause, accounting for some 21% of the data pool, were associated with explaining aspects of physical science. It includes those clauses used to explain aspects of natural science in non-vital ways. For example:

'Little light reaches the ground. Because of this, few other plants grow beneath the trees'.

'In hilly areas, there are few railways, because trains cannot go up steep slopes'.

'Oak is a late arrival because it does not grow as quickly as other species'.

'This is because winters are sunny'.

'Few plants or animals can live in the desert because there is not enough water for them'.

'The Gobi Desert has hardly any water because it is in the middle of the huge Asian continent'.

Category 5: Explaining human action in specific environments

These clauses (4% of the data pool) were associated with explaining people's actions by transferring the cause to an inanimate body. For those with insufficient prior knowledge, the explanations beg the question. For example:

'Because of the needs of modern forestry, conifers have now replaced large areas of natural deciduous woodland'.

'Tourists come to this large village because it has the longest place name in the British Isles'.

Category 6: Explaining the meaning of terms

This small category (about 1% of the data pool) comprised clauses of cause associated with explaining words and expressions and names of places. For example:

'There is also a lot of rain all the year round. Because of this, these forests are often called tropical rainforests'.

'The Gobi is called a continental desert because it's in the middle of a continent'.

Discussion

We do not claim that explanation depends entirely on clauses of cause or purpose. However, we do claim that counts of these clauses can be general

indicators of a concern for causal understanding. Nevertheless, an examination of the text itself is essential to identify the kinds of understanding that the book might support. To that end, distinctive uses of explanation in the books were identified. Knowledgeable and skilled teachers may be able to use any book to support causal understanding. These are not the teachers likely to need help. Attention here is more on the novice, those who cannot translate their knowledge into teaching discourse and those who lack relevant knowledge. To what extent could these books help such teachers engage effectively with causal understanding in geography?

The first point is that there was a wide variation in the books' provision of causal explanations: many books provided relatively few or none at all. We found no evidence that these used other pedagogical devices to support causal understanding. In effect, they are latter-day Cape and Bay books but now their facts are about, for instance, human influences on the environment. These books would probably be unable to redirect a teacher's attention to causal understanding. On the other hand, some of the other books did provide a significant amount of causal explanation. But the mere presence of causal explanation does not, in itself, indicate that these books would be useful. Their utility depends on the kind of explanation they support (and, of course, how they are used by the teacher).

Recall that the National Curriculum requires attention to places (e.g. 'why places change', 'why places are similar to and different from other places in the world'), patterns and processes (e.g. 'understanding patterns made by individual physical and human features in the environment'), and environmental change and sustainable development (e.g. why people may seek to manage environments sustainably) (DfEE/QCA, 1999: 110–13). Categories 1 and 2 (*Explaining the behaviour and adaptation of plants and non-human animals in specific environments* and *Explaining physical effects in specific environments*) accounted for the overwhelming majority of causal explanations in the data pool. These tended to explain why places, particularly their living parts, are as we see them. Science, especially natural science, was the causal component in the explanations. Categories 2 and 5 (both *Explaining human action in specific environments*) accounted for much of the remaining use of causal explanation. The categories tended to relate to people in their environment and how their behaviour was tuned to exploit it. In short, some books could have the kind of content that would point a teacher in the right direction for these aspects of the National Curriculum. On the other hand, there was little evidence of content that might foster the understanding of, for instance, procedures that the children might use in their geographical enquiry, as required by the National Curriculum for Geography (DfEE/QCA, 1999).

From this we conclude that there were books that could lead a teacher to address reasons relating to places, patterns and processes, environmental change and sustainable development, although to different degrees. A teacher would probably need to draw on more than one book for a comprehensive exemplification. This is not to say that these books *will* help a teacher. The analysis says nothing about the quality of the explanations or the quality of the writing and support for the exposition. None of the books analysed would be of much use in directing a teacher to address reasons in geographical enquiry. Such books may

exist but the danger is that, if teachers did not happen upon one, they may address geographical enquiry without a concern for the reasons that underpin what the children do.

The uneven concern for causal understanding in the books adds a problem. Teachers who are unclear about the kinds of understanding that should be supported may be unable to choose a book that points them in the right direction. They may, in practice, choose one that reinforces their existing teaching. Which brings us back to the beginning and to training. The training cannot simply be a cry for more subject content knowledge. As Martin (2000) has explained, simply raising subject knowledge is not enough. First, those on initial teacher training courses need to have a clear picture of what counts as learning in primary school geography. Further, they need to know that this includes various kinds of understanding and they must be clear what these are. Given this, they need to be trained to evaluate textbooks and choose those that satisfy the requirements, particularly in those areas where they, themselves, are weak. Next, they need to learn how to use these books imaginatively with children, avoiding lessons becoming nothing more than the passive acquisition of information. Writers today often go to great lengths to engage the reader's thinking with the subject. Where they do not, there are many strategies the teacher can use to make good the deficiency (Newton, 1990).

Courses for practising teachers are often short. On such courses, there is always a tension between satisfying the teacher's desire for teaching tips and developing understanding for the long term. The above procedure seems to offer some potential for helping them improve their geography teaching while feeling that they are engaged in something directly relevant to the classroom. There is, however, another source of help. If the subject coordinator (the teacher responsible for leading geography in the school) is also aware of the potential of some books to support some aspects of teaching and learning, he or she may choose the school's books in conjunction with the teachers. It may mean that a single book series may not be the outcome of such a choice. The loss of this uniformity may be offset by teachers who are more comfortable with what they teach. It does, however, mean that the coordinator will have to ensure that there is progression and that requirements are met.

For those who cannot or do not attend courses, the textbook could be a source of some self-improvement. Some time ago, the Qualifications and Curriculum Authority (QCA, 1998b) produced schemes of work for geography which describe what might be taught. Many have found this of some use. Nevertheless, it leaves a gap between plans and practice. A textbook could be a means of crossing that gap. It takes subject content knowledge to the children with language, analogies and examples that are meaningful to them – if, of course, you have the 'right' one. Some of those examined here could serve as a bridge – up to a point.

Using books in this way may risk them becoming straitjackets that eventually limit or contains a teacher's development. Hopkin (2001: 63) has described how books can 'mediate the reality of the world and reproduce particular geographies for pupils (and for teachers)'. Once written, these particular geographies can be long-lived, but books do change with time and respond to new expectations

(Zhang & Foskett, 2003) and, if teachers respond by updating their models, they are likely to benefit from an increased repertoire of pedagogical knowledge.

Finally, we can add a few words about the books from the point of view of the children. The books analysed were on the lists of the major educational publishers and represent a significant part of their output in primary school geography. Many had been reprinted more than once, indicating that they were not languishing in warehouses: this suggests that these books were available to children. There is evidence that the strength and number of clauses of cause and purpose determine the probability of comprehension and the recall of information read (Britton & Graesser, 1996). There were few such clauses in some of the books. Given that knowing why can also be satisfying and motivating, the diet these books offered was a spartan one if they were used without supplement. Even some that provided reasons confined their attention mainly to explaining the meaning of words. Some books, however, did seek to engage thought, asked for and provided reasons to justify assertions, and offered learning activities.

Conclusion

There are primary school textbooks that could point a teacher towards addressing reasons and causal understandings in some aspects of geography. These could help a teacher make good an inability to transform subject content knowledge into classroom discourse or make up for weaknesses in that knowledge. Care is needed, however, as textbooks are neither comprehensive nor uniform in their concern for reasoned understanding. Teachers need to be able to distinguish between books that have this concern and those that do not and recognise significant omissions. Given that many of these teachers will lack subject knowledge or appropriate conceptions of geography, they may not be able to do this well without guidance or training. Textbook writers and publishers need to be aware that geography, even elementary geography, is not simply descriptive. Further, they should be aware that reasons in some aspects of geography, such as enquiry, seem to receive little attention.

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